3.3.4 Hazardous Material Incidents

Hazardous materials are chemical substances, which if released or misused can pose a threat to the environment or health. Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are most often released as a result of transportation accidents or because of chemical accidents in plants.

3.3.4.1 Background

- A hazardous materials accident can occur anywhere. Communities located near chemical manufacturing plants are particularly at risk. However, hazardous materials are transported on our roadways, railways and waterways daily, so any area is considered vulnerable to an accident.
- Hazardous materials in various forms can cause death, serious injury, long-lasting health effects, and damage to buildings, homes, and other property.
- Varying quantities of hazardous materials are manufactured, used, or stored at an estimated 4.5 million facilities in the United States--from major industrial plants to local dry cleaning establishments or gardening supply stores.
- As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced.
- The Emergency Planning and Community Right-to-Know Act requires that detailed information about hazardous substances in or near communities be available at the public's request. The law provides stiff penalties for companies that fail to comply and allows citizens to file lawsuits against companies and government agencies to force them to obey the law.
- The Montana Department of Transportation (MDT) regulates transportation routes and speed limits used by carriers and monitor the types of hazardous materials crossing state lines.
- Between 1997 and 2006, there was an annual average of 16,379 hazardous materials transportation incidents nationwide. In 2005, there were 15,917 transportation incidents that resulted in 34 deaths and 938 injuries.
- The most common type of transportation hazardous material incident is from highway crashes (**Table 3.3.4-1**), followed by air incidents.
- Nationwide, most oil, chemical, and other discharges to the environment are from fixed facilities (37 percent) (**Figure 3.3.4-1**). In contrast, discharges from mobile facilities, including railroad, airline, and trucking, total about 16 percent.
- Montana has 4,379 EPA-regulated facilities. These fixed facilities are responsible for discharge to water, have toxic releases, handle hazardous waste, are Superfund facilities, and/or have airborne discharges.

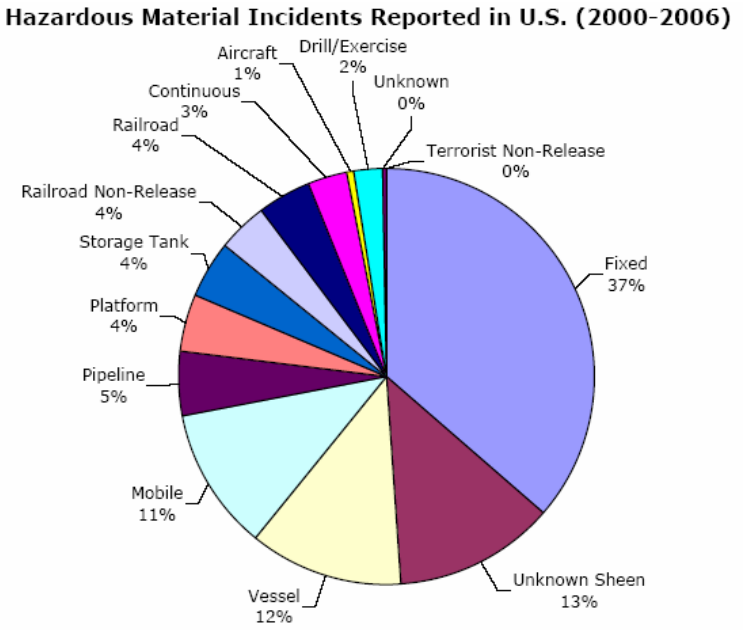
Sources: FEMA, 2004; EPA, 2007; NRC, 2007

Table 3.3.4-1 Hazardous Materials Incidents in the U.S. by Transportation Mode (1997 through 2006)

Mode of Transportation	Number of Accidents	Associated Deaths	Associated Injuries	Damages
Air	13,038	0	170	$2,736,156
Highway	141,525	126	1,536	$428,094,713
Railway	9,002	17	1,089	$156,781,906
Water	221	0	17	$3,880,738
Total	**163,786**	**143**	**2,812**	**$591,493,513**

Source: USDOT, 2007

Figure 3.3.4-1 Hazardous Material Incidents in the U.S. from 2000 to 2006 reported to the National Response Center (excluding vessel and oil drilling platform discharges). Source: NRC, 2007.



3.3.4.2 History of Hazardous Material Incidents in Montana

Since 1997, there have been 224 accidental releases in Montana reported from fixed facilities and transportation-related accidents that have exceeded 100 gallons/pounds (NRC, 2007). The most commonly-released substances have been refined petroleum products and crude oil. **Table 3.3.4-2** below summarizes the substances released by total volume and spills by either fixed facility or transportation-related incident. The table shows the greatest volume of substance released was diesel/fuel oil and the most common spill was other refined oil products.

Table 3.3.4-2 Summary of Releases by Substance (1997 through 2006)

Substance	Transportation			Fixed Facilities		
	Spills	Quantity	Units	Spills	Quantity	Units
Gasoline	14	1,056	gallons	11	37,650	gallons
Crude Oil	3	2,501	gallons	15	39,820	gallons
Aviation Fuel	2	not reported	-	0	-	-
Diesel/Fuel Oil	82	54,330	gallons	26	337,414	gallons
Asphalt	5	4,800	gallons	3	20,050	gallons
Other Refined Oil Products	36	4,386	gallons	47	3,333	gallons
Acids (Sulfuric/ Hydrochloric)	2	not reported	-	9	7,310 130,000	gallons pounds
Ammonia	5	48,000	pounds	9	1,076 381	gallons pounds
Chlorine Gas	-	-	-	4	60	pounds
Sulfur Dioxide (gas)	-	-	-	25	36,448	pounds
Methanol/Alcohol	3	55	gallons		6,757	pounds

Source: NRC, 2007

Table 3.3.4-3 shows a more recent summary of the hazardous material incidents reported to the National Response Center (NRC) by type of release (1997 to 2006). During this time, 976 incidents were reported. Most of the incidents (51 percent) were from fixed facilities, above the national average (37 percent). The second-most abundant incident type was from mobile facilities, including air and railroad incidents (24 percent), compared to the 16 percent national average.

Table 3.3.4-3 Hazardous Material Incidents Types and Receptors in Montana (1997 through 2006)

Type of Incident	Air	Land & Soil	Other	Sub-surface	Unknown	Water	No Release	No Info	Total
Aircraft		3							3
Continuous	10								10
Fixed	250	123	10	4	8	98	2		495
Mobile	3	73	4		5	69	2		156
Pipeline	16	38	1	2	3	24	1		85
Railroad	1	24	5		2	7		37	76
Railroad Non-release								59	59
Storage Tank	8	36	4		1	15			64
Unknown Sheen		3			4	12			19
Vessel						8	1		9
TOTAL	**288**	**300**	**24**	**6**	**23**	**233**	**6**	**96**	**976**

Source: NRC, 2007

The most significant transportation-related releases in the last ten years are listed in **Table 3.3.4-4**. The largest spills from fixed facilities are shown in **Table 3.3.4-5.**

Table 3.3.4-4 Largest Transportation-Related Spills (1997 through 2006)

Location/County	Date	Substance(s)	Amount	Units
Sidney/Richland	12/28/2000	Ammonium Nitrate Fertilizer	35,000	Pounds
Garrison/Powell	8/3/2004	Magnesium Chloride	27,000	Pounds
Circle/McCone	4/1/1998	Fertilizer	10,000	Pounds
Chester/Liberty	9/25/2003	Ammonia, Anhydrous	10,000	Pounds
Valier/Pondera	5/1/2005	Fertilizer	4,300	Pounds
Stanford/Judith Basin	11/1/2006	Oil: Diesel	30,230	Gallons
Columbia Falls/Flathead	4/29/1998	Coal Tar Pitch	16,000	Gallons
Manhattan/Gallatin	7/9/1998	Asphalt Seal Coat	4,500	Gallons
Hardin/Big Horn	1/2/1998	Oil: Diesel	4,000	Gallons
Missoula/Missoula	9/8/1999	Sodium Hypochlorite	3,000	Gallons
Glendive/Dawson	2/4/2004	Oil: Crude	2,500	Gallons

Source: NRC, 2007

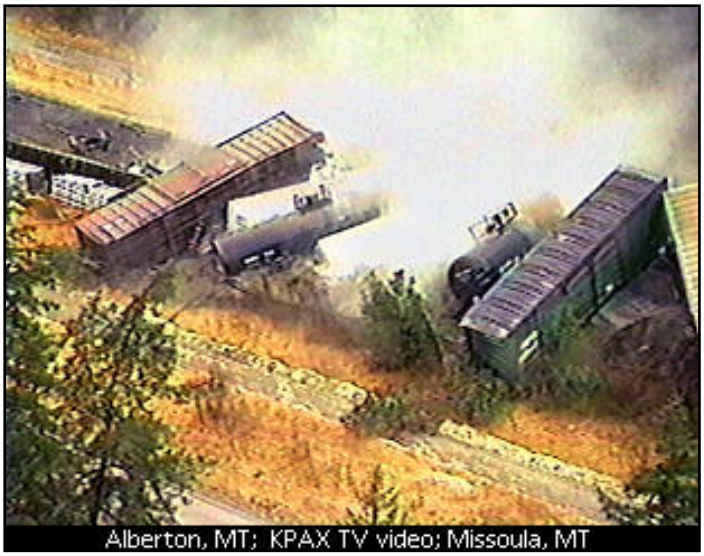
Table 3.3.4-5 Large Fixed Facility Spills (1997 through 2006)

Location/County	Date	Substance(s)	Amount	Units
Bozeman/Gallatin	7/17/1998	Asphalt Grinding	20,000	Pounds
Billings/Yellowstone	9/20/2006	Hydrofluoric Acid	130,000	Pounds
Billings/Yellowstone	11/11/1998	Sulfur Dioxide	27,500	Pounds
Great Falls/Cascade	12/5/2002	Oil: Diesel	15,000	Barrels
Great Falls/Cascade	10/6/1999	Oil, Fuel: No. 2-D	1,200	Barrels
Laurel/Yellowstone	9/23/1998	Unleaded Gasoline	630	Barrels
Billings/Yellowstone	11/16/1999	Oil, Fuel: No. 2-D	350	Barrels
Belfry/Carbon	6/10/2005	Oil: Crude	270	Barrels
East Helena/Lewis and Clark	5/28/1999	Hazardous Waste D010	8,300	Gallons
Roundup/Musselshell	10/10/1999	Oil: Crude	125	Barrels
Conrad/Pondera	1/31/1997	Oil: Crude	100	Barrels
Great Falls/Cascade	10/2/2002	Oil: Crude	100	Barrels
Colstrip/Rosebud	9/8/1997	Sulfuric Acid (50%)	4,800	Gallons
Belgrade/Gallatin	2/26/1997	Propylene Glycol	2,000	Gallons

Source: NRC, 2007

Alberton Chlorine Spill

On April 11, 1996, 19 cars from a Montana Rail Link (MRL) freight train derailed near Alberton, Montana. Six of the derailed cars contained hazardous materials. One derailed tank car containing chlorine (a poison gas) ruptured, releasing 130,000 pounds of chlorine into the atmosphere; another tank car containing potassium hydroxide solution (potassium cresylate, a corrosive liquid) lost 17,000 gallons of product; and a covered hopper car containing sodium chlorate (an oxidizer) spilled 85 dry gallons onto the ground. This chlorine spill is the second largest in US history.


Alberton, MT; KPAX TV video; Missoula, MT

About 1,000 people from the surrounding area were evacuated. Approximately 350 people were treated for chlorine inhalation, 123 of whom sustained injury. Nine people, including both members of the train crew, were hospitalized. A transient riding the train died from acute chlorine toxicity.

Photo 3.3.4-1 Alberton Derailment, Chlorine Gas Release

U.S. Interstate Highway 90 (I-90) is roughly parallel and about 150 yards north of the MRL tracks at the accident site. The hazardous material cloud drifted across I-90 resulting in multiple highway traffic accidents. Several motorists were stranded in the cloud after these accidents. I-90 was closed following the accident requiring an 81-mile detour. Monetary damage was estimated to be $3.9 million.

The Governor of Montana declared a state of emergency in Missoula and Mineral Counties. On April 14, 1996 the evacuation area was reduced to 15 square miles; the residents were temporarily escorted into the area to feed and water livestock animals, retrieve some personal possessions, and locate pets (NTSB, 1998).

3.3.4.3 Declared Disasters from Hazardous Material Incidents

Two separate incidents that occurred within one week are the only two state emergency declarations for hazardous material release: the Alberton Chlorine Spill and derailment involving a chlorine tanker car near Dodson (**Table 3.3.4-6**). The Dodson derailment did not cause a release of the chlorine.

Table 3.3.4-6 State and Federal Declarations for Hazardous Materials in Montana; 1974 through 2006

Incident	Date	Spill	Cost
Train Derailment at Alberton, MT (EO 8-96)	4/11/96	3 Chlorine tank cars	State: $417
Train Derailment Phillips County, Dodson (EO 9-96)	4/17/96	Chlorine tanker	State: $3,806

Source MDES, 2007

3.3.4.4 Vulnerability to Hazardous Material Incidents

3.3.4.4.1 Statewide Vulnerability to Hazardous Material Incidents

The volume and type of hazardous materials that flow into, are stored, and flow through communities will determine exposure to a potential release of hazardous materials.

The spill database, and locations of generator facilities and transportation routes (pipeline, rail, interstate) were compiled by county to identify relative vulnerability. Each factor was rated on a scale of 0 to 100, with the maximum of the range equaling 100 and no occurrences equal to zero. Each occurrence per county was factored by 100/max occurrence in that county. The seven factors were averaged to derive a composite index. For example, the maximum number of transportation spills in a single county was 8 for Yellowstone County. Lewis and Clark County had 2 transportation-related hazardous material releases for a score of 2*12.5, or 25, compared to Yellowstone's score of 100. **Table 3.3.4-7** shows vulnerability scores of the top ten counties for hazardous material spills. **Figure 3.3.4-2** shows the relative vulnerability across the state by county.

Table 3.3.4-7 Counties with High or Moderate Hazardous Material Composite Index

	Spills		Generators		Miles			Haz Mat
County	Trans-portation	Fixed Facilities	LQG	TRI	Interstate	Pipeline	Rail	Comp Risk Index
Yellowstone	8	84	6	16	95	332	168	95.05
Cascade	6	17	3	4	61	118	196	50.68
Missoula	3	17	5	8	55	49	190	49.41
Gallatin	3	8	4	4	44	41	213	41.63
Lewis and Clark	2	16	2	5	50	44	104	31.27
Silver Bow	4	0	4	4	55	0	127	36.29
Jefferson	6	3	0	4	95	5	134	37.52
Rosebud	0	4	2	2	42	56	182	27.60
Flathead	6	2	4	3	0	0	122	30.81
Big Horn	5	16	0	2	82	77	94	34.68
Mineral	5	16	0	0	77	0	138	31.83

Fixed and Transportation Spills from National Response Center database 1997-2006 (NRC, 2007)
LQG: Large Quantity Generators of Hazardous Waste from U.S. EPA Envirofacts Query (EPA, 2007)
TRI: Facilities required to report toxic releases from U.S. EPA TRI Explorer (EPA, 2007)
Interstate: Interstate Miles from NRIS Highway shapefile coverage (NRIS, 2004)
Pipeline: Pipeline Miles from NRIS Pipeline shapefile coverage (NRIS, 2004)
Rail: Rail Miles from NRIS Railline shapefile coverage (NRIS, 2004)

3.3.4.4.2 Review of Potential Losses in Local PDM Plans

Figure 3.3.4-3 presents the Hazardous Material Incident Hazard Risk Map. The colors represent a high-medium-low risk rating based on information in the Local PDM Plans. The gray color indicates this hazard was not assessed in the Local Plan. The hatch pattern indicates the Local Plans were not available for review. For electronic users of the State Plan, clicking on a county or tribal reservation will take you to the Local Plan where further information is available.

Table 3.3.4-8 presents a summary of potential loss estimates due to hazardous material incidents as calculated in the Local PDM Plans. Hazardous material loss is described in terms of its effect on buildings, society and the economy, where generally:

- Building loss is presented either as a dollar value or a high-moderate-low rating and typically refers to the potential loss to critical facilities in the jurisdiction.
- Societal loss is presented either as the number of lives at risk or as a high-moderate-low rating representing the potential for loss of human life.
- Economic risk is presented as a dollar value or high-moderate-low rating referring to the potential impact to the economy of the local jurisdiction.

References cited in **Table 3.3.4-8** correspond to a description of the method used to calculate potential loss that can be found in *Section 7.14.*

Figure 3.3.4-2 Hazardous Material Vulnerability Index

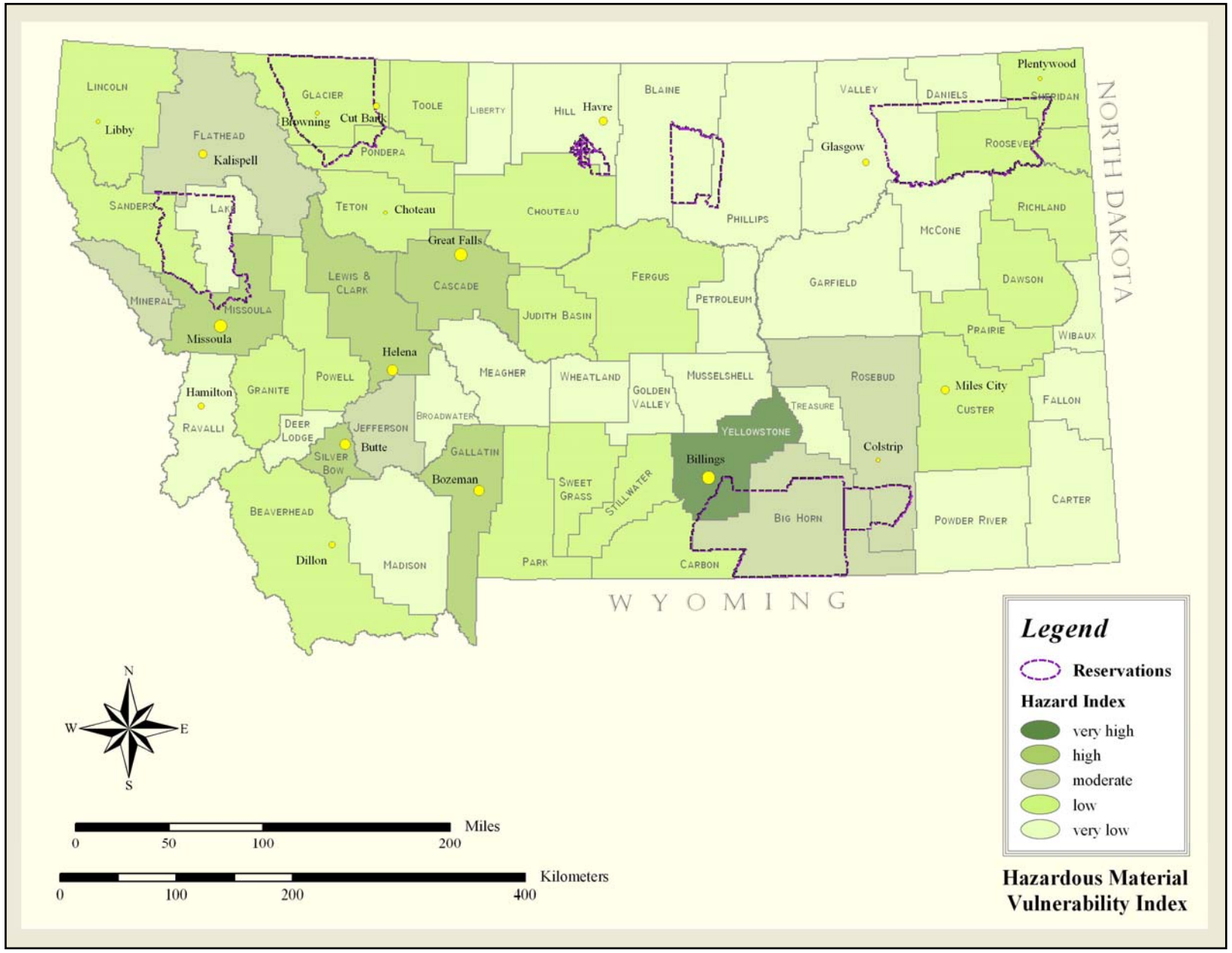


Figure 3.3.4-3 Hazard Risk Map: Hazardous Material Incident

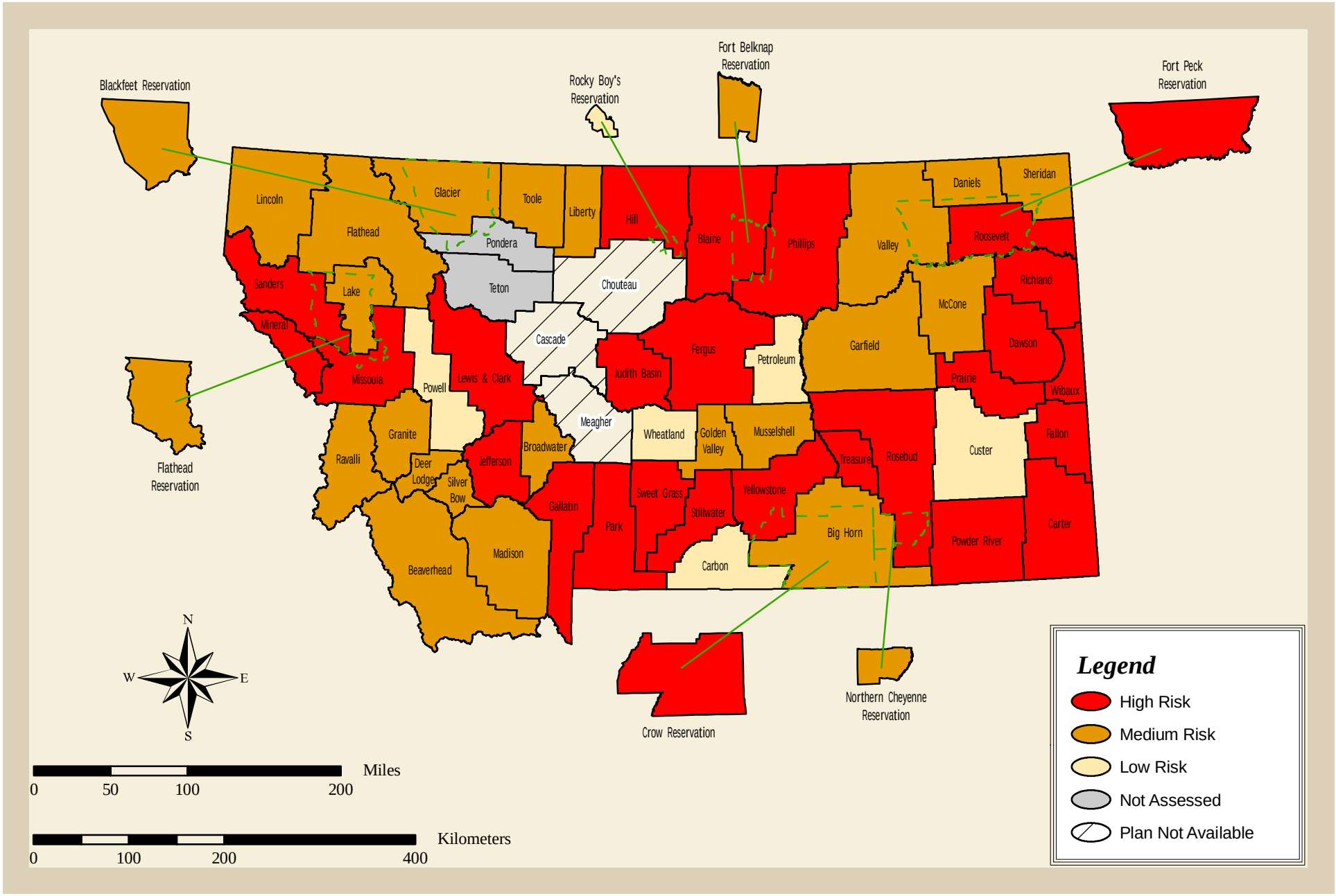


Table 3.3.4-8 Potential Losses from Local Plans: Hazardous Material Incidents

DES District	Jurisdiction	Building Loss	Societal Loss	Economic Loss	Reference
1	Deer Lodge County	Low	Moderate	Moderate	1
1	Flathead County	Low	100-2,000	Low	8
1	Flathead Reservation	$25,934,00	2002	NA	2
1	Granite County	Low	High	Moderate	1
1	Lake County	$25,934,000	2002	NA	2
1	Lincoln County	NA	2	NA	9
1	Mineral County	$500,00-$1 million	Moderate	NA	10
1	Missoula County	NA	NA	NA	
1	Powell County	Low	Low	NA	10
1	Ravalli County	NA	NA	NA	
1	Sanders County	$20,779,398	1210	NA	2
1	Silver Bow County	Low	100-1,000	Low	1
2	Blackfeet Reservation	$211,628	5.3	NA	2
2	Blaine County	$305,516	5.7	NA	2
2	Cascade County	U	U	U	
2	Chouteau County	U	U	U	
2	Fort Belknap Reservation	$6,884	0.3	NA	2
2	Glacier County	NA	NA	NA	
2	Hill County	$2,616,186	11.8	NA	2
2	Liberty County	NA	Low-Medium	High	11
2	Pondera County	NA	NA	NA	
2	Rocky Boy's Reservation	$6,405	0.5	NA	2
2	Teton County	NA	NA	NA	
2	Toole County	High	High	NA	11
3	Beaverhead County	$138,300,000	3,565.8	NA	5
3	Broadwater County	$15,000,000	High	High	1
3	Gallatin County	Low	High	High	12
3	Jefferson County	NA	NA	NA	
3	Lewis & Clark County	NA	NA	NA	
3	Madison County	NA	479	NA	7
3	Meagher County	U	U	U	
3	Park County	Low	High	High	1
3	Sweet Grass County	NA	NA	NA	
4	Carter County	Low	Low	Moderate	12
4	Custer County	NA	NA	NA	
4	Dawson County	$1,000,000	NA	NA	8
4	Fallon County	$50,000-$3 million	NA	NA	8
4	Garfield County	Moderate	544	Moderate-High	1
4	McCone County	NA	Moderate	Millions	3
4	Powder River County	Moderate	1,015	Low	1
4	Prairie County	NA	NA	Millions	3
4	Richland County	NA	Moderate	Millions	3
4	Wibaux County	$64,000	Moderate	Moderate	3
5	Big Horn County	Severe	Severe	$6,000,000	3
5	Carbon County	$53,000	NA	NA	8

Table 3.3.4-8 Potential Losses from Local Plans: Hazardous Material Incidents

DES District	Jurisdiction	Building Loss	Societal Loss	Economic Loss	Reference
5	Crow Reservation	$6,000,000	High	High	3
5	Golden Valley County	$21,166	0.45	NA	2
5	Musselshell County	$173,888	2.98	NA	2
5	Northern Cheyenne Reservation	NA	Moderate	Millions	3
5	Rosebud County	Moderate	High	High	1
5	Stillwater County	$272,000	NA	NA	8
5	Treasure County	Moderate	High	High	1
5	Wheatland County	$12,090	1.7	NA	2
5	Yellowstone County	NA	NA	NA	
6	Daniels County	$31,416	0.5	NA	2
6	Fergus County	NA	9	9	4
6	Fort Peck Reservation	$539,428	14.7	NA	2
6	Judith Basin County	$94,000	1.6	NA	2
6	Petroleum County	NA	NA	NA	
6	Phillips County	$28,583	3.2	NA	2
6	Roosevelt County	$818,726	22.1	NA	2
6	Sheridan County	$352,794	5.5	NA	2
6	Valley County	$536,777	7.7	NA	2

Notes: U = Local PDM Plan not available for review; NA = not assessed in Local PDM Plan
Potential loss was computed was not computed in a uniform manner in Local PDM Plans. See number references in *Section 7.14* for a description of the methods used to determine potential building, societal, and economic loss.

3.3.4.4.3 Vulnerability of State Property

Current data and history does not suggest that state property is highly vulnerable to hazardous material releases, however, depending on the proximity of state facilities to hazardous material transportation routes and fixed facilities, some locations may be more vulnerable than others. Since the locations of State buildings have not been geo-referenced, assessing the potential exposure of property and buildings from hazardous material releases would be highly inaccurate.

3.3.4.5 Impact of Future Development

Much of the future development currently occurring in the State is off of the major road and rail networks. The potential does exist for development of agricultural lands bordering the highways and railroad, particularly in the unincorporated parts of the State. Very few restrictions are in place to prevent development in these areas.

3.3.4.6 Hazardous Material Incidents Data Limitations

Fixed facilities that generate or store hazardous materials have not been mapped on a statewide basis. Such mapping, coupled with the type and maximum amount of hazardous material being generated or stored, would allow for the identification of hazard zones surrounding the facility. In addition, the current Montana State building database is not geo-referenced and cannot be effectively related to spatial coordinates except in general locations (by city or zip code centroid). Detailed transportation analyses identifying the types and number of vehicles transporting hazardous materials have not been conducted statewide and could prove useful for future assessments.

3.3.4.7 Hazardous Material Incidents References

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